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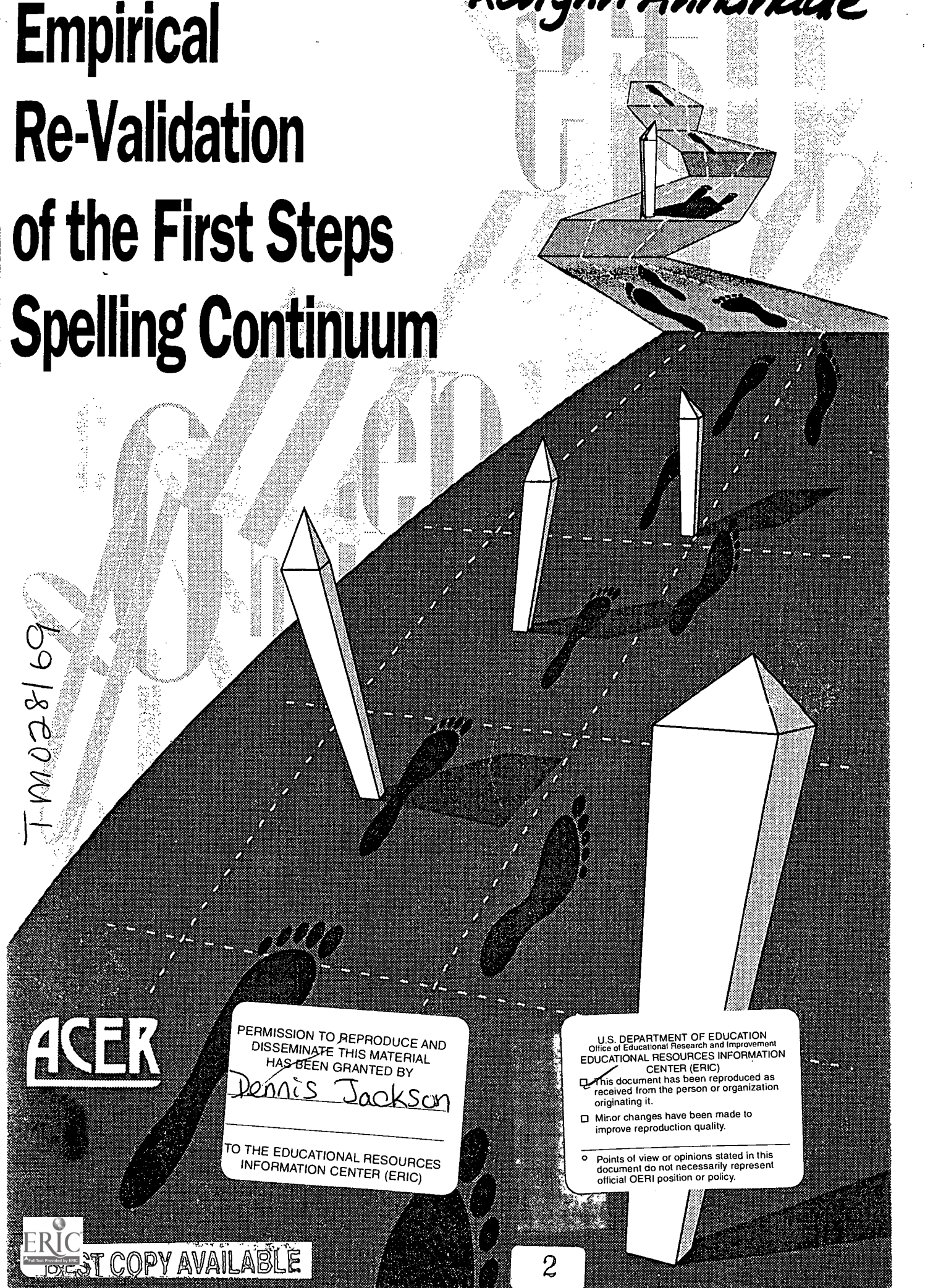
ABSTRACT

First Steps is a program instituted by the Western Australia Ministry of Education to improve the literacy and numeracy of primary school students, particularly those at risk of academic failure. First Steps is organized around reading, writing, spelling, and oral language; children's skills are organized along developmental continua. These continua are an ordered series of statements describing behaviors children display as they move toward literacy. The Spelling Developmental Continuum was revised as a response to a study of teachers' responses to the wording of indicators along the continuum, and this report is an empirical validation of the changed version of the Spelling Continuum. Teachers of Kindergarten, Year 1, Year 3, Year 5, and Year 7 (n=88) provided judgments of up to 10 of their students in relation to the Spelling Continuum. Teachers also responded to questions about the indicators and the whole continuum. Overall, there was a high level of understanding of the indicators from the revised continuum. The revised continuum was thought to depict the development of children's spelling competencies validly, with the exception of two problem areas: (1) indicators in the Transitional Phase were not thought to be more difficult than the indicators in the developmentally earlier Phonetic Phase; and (2) key indicators in the Phonetic Phase were thought to be less difficult than those in the developmentally earlier Semi-Phonetic Phase. The revised continuum was thought to be more coherent with more clearly delineated steps than the original version. Four appendixes contain codes for the indicators, information on the perceived difficulty of indicators, a list of indicators not clearly understood, and a list of changes made to the previous version. (Contains 20 exhibits and 6 references.) (SLD)

Empirical Re-Validation of the First Steps Spelling Continuum

Kerry Hannan



Editor's Note

This document is one of a series of reports that document the formative research that supported the creation and development of *First Steps*™. As a result of this research, the Education Department of Western Australia (EDWA), in collaboration with the Australian Council for Educational Research (ACER) revised *First Steps* in response to each of the issues and questions raised by this research. *First Steps* training courses, Developmental Continua, and Resource Books are published with due amendments and alterations.

Other research documents that support the development of *First Steps* include:

Dr. Phil Deschamp:

- A Survey of the Implementation of the Literacy Component of the *First Steps* Project in WA
- The Implementation of The Literacy Component of The *First Steps* Project in ELAN Schools
- A Survey of the Effectiveness of the Focus Teacher 'B' Training for the *First Steps* Project
- Student Achievement: A Study of the Effects of *First Steps* Teaching on Student Achievement
- Case Studies of The Implementation of the *First Steps* Project in Twelve Schools
- The Development and Implementation of the *First Steps* Project in Western Australia

ACER:

- Empirical Validation of the *First Steps* Reading Continuum
- Empirical Validation of the *First Steps* Spelling and Writing Continua
- Empirical Re-Validation of the *First Steps* Spelling Continuum
- Assessment and Record of the Changes made to the Spelling Continuum
- The Impact of *First Steps* on Schools and Teachers
- The Impact of *First Steps* on the Reading and Writing Ability of Year 5 Students
- Background: *First Steps* and the ACER Evaluation & Report on the Validity of the *First Steps* Writing and Spelling Continua*

EDWA:

- Supporting Linguistic and Cultural Diversity Through *First Steps:* The Highgate Project

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REPORT ON THE RE-VALIDATION OF THE FIRST STEPS SPELLING DEVELOPMENTAL CONTINUUM.

to the

Curriculum Development Branch

Western Australian Ministry of Education

ACER

Australian Council for Educational Research, December 1993.

Thanks to all the schools who agreed to participate in the evaluation of First Steps, and thanks to all the classroom teachers who so generously provided the data.

Note for the teachers who provided data for the empirical validation of the Spelling Development Continuum - the data from the questionnaires which you completed are not reported here. They are reported in Part 2 of the companion volume The empirical validation of the Reading Development Continuum.

SUMMARY OF THE MAIN FINDINGS

1. There is a very high level of understanding of the indicators from the revised First Steps Spelling Developmental Continuum by the Kindergarten, Year 1, 3, 5 and 7 classroom teachers participating in this evaluation.

2. The revised Spelling Developmental Continuum, in general, validly depicts the development of children's spelling competencies. However, two problems are identified. These are:

- the indicators in the Transitional phase are not, on average, more difficult than the indicators in the developmentally earlier Phonetic phase, and,
- the key indicators in the Phonetic phase are generally less difficult than the key indicators in the developmentally earlier Semi-phonetic phase .

3. All key indicators in the revised Spelling Developmental Continuum are appropriately defined by First Steps as 'key indicators' in that they seem to strongly tap spelling ability.

4. The revised version of the Spelling Developmental Continuum is more coherent and its Phases are more clearly delineated along the scale of difficulty than the earlier version. In short, the changes made to the Spelling Developmental Continuum as a result of the first validation exercise have, from the perspective of the current validation, improved it.

CONTENTS

APPENDICES

Appendix A Code numbers for the First Steps Spelling indicators used in graphical displays. Appendix A is printed on pink paper.

Appendix B Estimates of the difficulty of Spelling Continuum indicators ordered by code number and ordered by the estimated difficulty of the indicators. Appendix B is printed on blue paper.

Appendix C List of indicators from the Spelling Continuum not understood by some Kindergarten, Year 1, 3, 5 or 7 classroom teachers. Appendix C is printed on green paper.

Appendix D List of changes made to the previous version of the Spelling Developmental Continuum. Appendix D is printed on buff paper.

INTRODUCTION

In 1992 the Australian Council for Educational Research conducted an evaluation of aspects of the First Steps project. One part of this evaluation involved the empirical validation of the Spelling Developmental Continuum.

The validation found that the Spelling Developmental Continuum, in general, validly depicted the development of children's spelling competencies. However, two problems were identified. These problems were:

- the indicators in the Transitional phase were , on average, less difficult than the indicators in the developmentally earlier Phonetic phase and,
- the key indicators in the Phonetic phase were generally less difficult than the key indicators in the developmentally earlier Semi-phonetic phase .

In response to these and other more specific problems that were identified, the First Steps project re-examined some of the indicators and proposed new wordings (and other changes) to try and make the meaning of particular indicators clearer and to give more coherence to the Continuum as a whole. ACER was then asked to re-validate this newly worded Spelling Continuum.

Aim of this report

This report aims to describe the empirical validation of the changed version of the Spelling Developmental Continuum.

THE EMPIRICAL RE-VALIDATION OF THE SPELLING DEVELOPMENTAL CONTINUUM

The research objective

The objective of the empirical re-validation of the Spelling Developmental Continuum is to collect information about the typical sequence in which students learn and to compare this with the sequence of learning proposed in the revised version of the Spelling Developmental Continuum.

The research is not concerned to establish the validity or the meaning of the concepts used to describe the indicators. The research reported here cannot answer questions about whether an indicator is meaningful or accurate. This research is designed to find out about the ordering of the indicators as proposed by First Steps.

The Spelling Developmental Continuum will be regarded as validated if the order of the indicators proposed by First Steps matches the order of development that teachers see in their students.

The research objective will also involve comparing the patterns observed in the data using the modified version of the Spelling Developmental Continuum with the patterns found in the earlier validation study of the unmodified version to see how well the changes made to the Continuum have worked.

The research questions

The following specific questions are addressed in this report:

Which First Steps indicators do teachers not understand?
Are the indicators within a phase at about the same level of difficulty?
Do the phases reflect a sequence which implies increasing difficulty?
How 'key' are the 'key indicators'?

These are the same research questions used in the original validation of the Spelling Developmental Continuum. They are repeated here to provides as complete a picture as possible of the impact of the changes made to the Continuum.

The Sample

The data for the re-validation of the Spelling Developmental Continuum were provided by teachers of Kindergarten and Years 1, 3, 5 and 7 from a sample of Western Australian government primary and District High schools.

The sample was not randomly drawn. Schools known to have a long involvement with the Spelling Developmental Continuum were identified by staff in the regional offices of the Ministry. Teachers who were well versed in the use of the Continuum were needed so that they could be accurate in their judgements.

Altogether 99 teachers were approached to participate in this part of the evaluation. Of these 99 teachers, 88 returned data that could be used. Exhibit 1 shows the numbers of teachers who responded for each Year level.

Exhibit 1: Number of teachers providing data for the re-validation of the Spelling Developmental Continuum for each Year level.

Kinder	Yr 1	Yr 3	Yr 5	Yr 7	Total
14	20	20	20	14	88

The Data

The data consisted of judgements made by teachers about the extent to which each of up to ten students in their class exhibited evidence of having demonstrated the behaviour described by each of a number of First Steps indicators. (The teachers made these judgements about each child in turn and not about the group of children.) These judgements were recorded on a computer used by the teachers. They tapped one of a set of appropriate keys to register their response. There were two sets of responses available to a teacher depending upon which indicator was displayed to them. The response set to be used was pre-determined. Teachers could not choose which response set to use.

The first response set was:

Y - (Yes/Most of the time)
This key was to be pressed if the named student usually demonstrated this behaviour.
N -(No/Hardly Ever)

This key was to be pressed if the named student did not or hardly ever demonstrated this behaviour.

U - This key was to be pressed if the teacher was unable to make a judgement. If they responded with 'U', the program asked the teacher to select one of the following:

1 - 'I have not yet had an opportunity to gather information relating to this indicator.'

2 - 'I don't understand the wording of this indicator.'

If the teacher entered 'U' then the program displayed all students' names, and beside them the response - 'U'. That is, if the teacher did not understand the indicator for one student, it was assumed that they did not understand it for all students. If the teacher had understood the indicator, then, after all students had been evaluated with respect to that indicator, the results of the teacher's judgements were displayed on the screen and an opportunity was given to alter the data.

The use of the first response set was not appropriate for all indicators. If this response set, and only this response set, had been used, then it would have led to ambiguous responses for some indicators. A response 'Hardly ever' could mean that the child has yet to learn a particular behaviour described by an indicator. It could also mean that the child has advanced beyond this behaviour and so abandoned it. To overcome this, a second response set was developed. This second response set had the additional category of 'Beyond'.

The second response set was:

B - (Beyond this level.)

This key was to be pressed if (1) the indicator was phrased negatively and the student demonstrated evidence of being able to perform the converse of the indicator, (2) the indicator began with the phrase 'Beginning to ...' and the student had fully acquired the skill referred to in to the indicator or (3) a student had developmentally 'left behind' the indicator and so no longer demonstrated evidence of it (as opposed to having yet to develop this skill).

Y - (Yes/Most of the time)

This key was to be pressed if the student usually demonstrated this behaviour.

N -(No/Hardly Ever)

This key was to be pressed if the student did not or hardly ever demonstrated this behaviour and was yet to move beyond the level required to demonstrate competence on this indicator.

U - This key was to be pressed if the teacher was unable to make a judgement. (The same categories - 1 or 2 - as for the first response set were then displayed.)

In the data analysis 'Yes' and 'Beyond' were treated as having identical meaning and so coded to the same value. (Responses with the value 'U1' and 'U2' - unable to make a judgement - were excluded from the analysis which located the indicators on a Continuum of development.)

Most teachers were asked to provide data for the first five female students on a class list and for the first five male students on a class list. If a class had fewer than five female students or fewer than five male students then teachers were asked to 'top up' with other students from the class. In some small schools and in some composite classes there were less than ten students at a given Year level. In these cases, teachers were asked not to top up with students from other Year levels.

Exhibit 2 shows the total number of students involved in the study for each Year level.

Exhibit 2: Number of students involved in the study for the validation of the Spelling Developmental Continuum for each Year level.

Kinder	Yr 1	Yr 3	Yr 5	Yr 7	Total
136	197	191	174	145	843

The data for the re-validation of the Spelling Development Continuum were collected in November 1993.

In summary, the data consist of judgements made by classroom teachers about the spelling behaviours of selected students.

Differences between the earlier version of the Spelling Developmental Continuum used in the first validation and the version used in the re-validation.

Appendix D lists the indicators which were identified as aberrant in the first validation of the Spelling Development Continuum. These indicators were aberrant because they were not understood by teachers or because they did not tap spelling ability as well as other indicators or because they were considerably more or less difficult than the rest of the indicators within their Phase.

There were six aberrant indicators in the Preliminary Spelling Phase or which two were changed for this revalidation. There were five aberrant indicators in the Semi Phonetic Spelling Phase of which four were changed. There were six aberrant indicators in the Phonetic Spelling Phase and all were changed. A new indicator was also added to this phase. There were nine aberrant indicators in the Transitional Spelling Phase and all nine were changed. There were no changes made to the Independent phase because no indicators were found to be aberrant.[1]

The Design of the Research

It was decided to design the data collection in such a way as to avoid asking teachers about indicators which described behaviours that would be unlikely to be observed in their students. For example, Kindergarten teachers were not asked to provide data about the indicators in the Transitional or Independent Spelling Phases because it was felt to be most unlikely that any Kindergarten students would have of the spelling skills found in these Phases.

In order to ensure that the data could still be used to depict a sequence of development across all phases of a Continuum, each Year level had at least one phase in common with the Year level below it or with the Year level above it. Exhibit 3 shows which phases of the Spelling Developmental Continuum were used by Year level, how these phases overlapped and how many indicators were in each phase. For example, in Exhibit 3, the column under the title 'Yr 1' indicates that Year 1 teachers providing data on the Spelling Developmental Continuum had indicators drawn from the

[1]There were other changes made to the wording of indicators as part of a review process conducted by personnel in the Western Australian Ministry of Education. It is not clear to what extent these changes were undertaken as a result of the earlier ACER validation of the Spelling Development Continuum. Only those changes known to be have been made directly as a consequence of the earlier ACER validation are included in Appendix D. All these changes are considered in detail in the companion report *An assessment of the changes made to the First Steps Spelling Development Continuum.*

'Preliminary', the 'Semi Phonetic' and the 'Phonetic' Phases. This means that for these Year 1 teachers there were 67 (23+ 21+ 23) indicators judged per child.

Phases were matched to Year level using advice from the First Steps project personnel. The matching was designed to ensure that the chosen phases were appropriate to the level of development of the students. Inappropriate phases were, either, ones which contained indicators which all students of a given Year level would exhibit, or which contained indicators which no students, of a given Year level, would exhibit. A mix of student abilities was needed.

Exhibit 3: Number of indicators per phase of the First Steps Spelling Developmental Continuum for each Year level and distribution of phases across Year levels.

Spelling Continuum Phases	N. of Indicators	Kinder	Yr 1	Yr 3	Yr 5	Yr 7
Independent	20					√
Transitional	19			√	√	√
Phonetic	23	√	√	√	√	√
Semi Phonetic	21	√	√			
Preliminary	23	√	√			
Total N of Indicators	106	67	67	42	42	62

Teachers providing data about the Spelling Developmental Continuum were, depending on the Year level taught and the number of students assessed, making in total between 420 and 670 judgements upon the spelling behaviours of their students.

Method of Data Collection

All teachers were sent a computer disk. On this disk was a computer program written by staff at ACER. When the program was run, it prompted teachers for responses to questions. These responses were stored on the disk and when the teacher had entered the data, the disks were returned to ACER. Each teacher received a disk containing the teacher's name, the Year level of the students about whom the teachers would be making judgements, and the indicators for the phases of the Continuum for which they would be providing data.

When the program was run the teacher was first asked to enter the names of the students to be used, that is, the names of the first five boys and the first five girls on a class list. (Where this was not possible alternatives, described above, were adopted.) These names were needed so that the teacher could be prompted for each specific child. The names of both the children and the teachers were removed from the data at ACER and no record has been retained of them.

Teachers were next asked the following questions about each child:

What is the child's sex? (M/F)

Is English the first language of the child? (Y/N)

Is the child an Aboriginal or Torres Strait Islander? (Y/N)

Is the child receiving English as a Second Language assistance? (Y/N)

Does the child have a disability that could significantly affect achievement in English? (Y/N)

Once this was done, the teacher was presented the text of an indicator with the instruction to assess each student with respect to the indicator on display. The indicators were presented to the teachers in random order. The teachers knew only that the indicators were from the Spelling Development Continuum and that the indicators only came from two or three phases. They did not know, unless they recalled it from their own use of the Continuum, from which phase a displayed indicator came. Teachers also did not know if an indicator was a key indicator. They were not told that some of the indicators differed from the version that they were currently using with their class.

It was estimated that teachers would take up to two hours to make all their judgements and enter the data. The computer program was designed so that teachers could quit before completing all the data entry and resume later.

Method of Data Analysis

The data for the empirical validation were analysed using the computer program 'Quest' (Adams and Khoo, 1992) which produces Item Response Theory calibrations of indicators and measures of student achievement. An outline of this approach is provided below.

Data Analysis

The first step in the analysis was to analyse data that had been collected about the students in the study. If these children had characteristics which suggested that their development of literacy skills might occur in a different order from most other students, then it was important to know this because it could effect the interpretation of results.

It was possible to remove non-typical children from the analysis in an attempt to avoid any possibly distorting effects on the results. However, it was decided to retain all children because First Steps was instituted to assist precisely those children whose non-typicality placed them 'at risk'. Also, keeping all these students in the analysis means that the results are based upon a group of students who are, probably, typical of most classrooms. There were, in any case, few students in the sample who might exhibit non-typical patterns of development.

Attributes of the Children

1. Sex

It is generally the case that girls are more precocious than boys in the acquisition of literacy skills. It was therefore felt important to describe the distribution of the sex of the students. Exhibit 4 shows this for each Year level for the Spelling Developmental Continuum.

Exhibit 4: Frequency and percentage of students involved in the study of the Spelling Developmental Continuum by sex for each Year level.

	Kinder	Yr 1	Yr 3	Yr 5	Yr 7	Total
Female	68 (50%)	105 (54%)	97 (50%)	86 (50%)	75 (52%)	431(51%)
Male	68 (50%)	91 (46%)	94 (50%)	88 (50%)	70 (48%)	411 (49%)
Total	136 (100%)	196* (100%)	193 (100%)	174 (100%)	145 (100%)	842

* *One Year 1 child did not have their sex identified.*

Exhibit 4 shows that the number of boys and girls is very similar for each Year level This was expected because of the selection procedure that was used.

2. English as a second language (ESL)

It was important to identify children for whom English is a second language because, according to research conducted by the English as a Second Language Unit, WA Ministry of Education, the 'levels of competency displayed by second language learners do not reflect their actual levels of concept development.' (*Writing Developmental Continuum*, p. *v*) If there had been a large proportion of ESL children in the sample used for the validation of the Continuum then a distortion of the relationship between the range of difficulty within different phases may have occurred. In fact, there were only three ESL students in the sample. There was one Year 3 student and two Year 5 students with English as a second language. It was judged that inclusion of these three children would not effect the data analysis to any important extent.

3. Disability affecting achievement in English.

Teachers were asked if any of the children about whom they were making judgements had a disability that could 'significantly affect achievement in English'. As Exhibit 5 shows, the proportion of students described by teachers as having a disability that could affect performance in English was low. It was judged that inclusion of these three children would not effect the data analysis to any important extent.

Exhibit 5: Frequency and percentage of students involved in the study with a disability affecting their performance in English for each Year level.

Kinder	Yr 1	Yr 3	Yr 5	Yr 7	Total
4 (3%)	8 (4%)	4 (2%)	2 (1)%	1 (<1%)	19 (2%)

4. Aboriginality

The data identifying whether a student was an Aboriginal or a Torres Strait Islander were collected so that if sufficient numbers of students were identified, analyses could be run separately for this sub-group. There were 58 (7%) of students who were identified as Aboriginal or Torres Strait Islanders. This was too few for these analyses to be conducted. The data on Aboriginality were, therefore, not used in the validation of the Continuum.

Empirical Validation of the Spelling Developmental Continuum

In this part of the report four main questions are addressed:

1. Which Spelling Continuum indicators do teachers not understand?
2. Are the indicators within a phase at about the same level of difficulty?
3. Do the phases reflect a sequence which implies increasing difficulty?
4. How 'key' are the 'key indicators' of the Spelling Continuum?

In answering these questions, the first and fourth are addressed directly. The second and third questions, however, need to be approached less directly. To answer these questions, the method used to validate the Spelling Continuum is described. Next, an ideal model is proposed. This model shows how the level of difficulty of indicators within a phase ought to appear if a Continuum is to depict children's development. The model also shows how the phases ought to reflect the increasing levels of difficulty along such a continuum. Once this ideal model is described, the validation of the Spelling Developmental Continuum, using the data provided by the teachers can begin. The Continuum is evaluated by comparing patterns in the data to the ideal model. The closer the patterns approach the ideal model, the more valid the Spelling Developmental Continuum will be. It is only at this point that the second and third questions can be answered.

Each of the four questions is now addressed.

1. Which First Steps indicators do teachers not understand?

It is important to know how well teachers understand the indicators. Generally, if there are many misunderstandings then the Continuum will not be consistently used. More specifically, if the indicators are not well understood then the data supplied by teachers for the validation will be adversely effected. The data, used here to validate the Continuum, rely on teachers understanding the indicators. (Any indicators which teachers do not understand are excluded from the validation procedure.)

When making judgements about a student's competency on an indicator, teachers were able to indicate whether they understood the indicator or not. Analysis of their responses shows that the indicators are well understood by the teachers who participated in this section of the evaluation. It should be noted, however, that this is not evidence that they all understand the indicators in the same way.

From the analysis of their responses it was found that of the 106 indicators from the Spelling Development Continuum 21 were not understood by some teachers. Of the 21 indicators not understood, 3 came from the 23 indicators in the Preliminary Spelling Phase, 4 came from the 21 in the Semi Phonetic Phase, 8 came from the 23 in the Phonetic Phase, 6 came from the 19 in the Transitional Phase and none came from the 20 in the Independent Phase. Of the 21 indicators not understood, 10 were not understood once, 7 were not understood by two teachers and 4 were not understood by three different teachers. The indicators not understood by three teachers were:

The child is willing to 'have a go' at representing speech in print form (1319)
The child is willing to spell on his/her own (1322)
The child uses word sources confidently (1323)
The child has an interest in words and enjoys using them (1419)

These indicators may require clarification.

Appendix C lists all indicators not understood by teachers and the number of teachers who did not understand them.

In summary, about 80% of all indicators were understood by all the teachers who responded to this part of the evaluation. Of the 20% of indicators not understood by all teachers, most of these were not understood on only 1 or 2 occasions. Thus teachers seem to well understand the Spelling Developmental Continuum indicators.

2. Validation

a. Calibrating Indicators

Before considering the results of the empirical validation of the Spelling Developmental Continuum it is necessary to outline how the data were analysed.

The first aim of the data analysis was to 'calibrate' the indicators for the Spelling Development Continuum. The calibration process (based on the Rasch[2] model) estimates a 'difficulty' level for each indicator. In general, the greater the number of students achieving an indicator, the 'easier' (lower on the scale of difficulty) that

[2]Named after the Danish psychometrician who invented the mathematical procedures upon which Item Response Theory is based.

indicator is estimated to be. In this way the calibration process thus parallels the intention of First Steps by seeking to locate indicators at positions along a Continuum.

Put more simply, a First Steps Continuum can be likened to a pathway along which children progress, acquiring literacy skills as they go. The further along this pathway the child goes, the more difficult it becomes. On a real path, the difficulty increases as a function of physical tiredness. On the metaphoric pathway to literacy, the difficulty increases because the behaviours the children will show require higher levels of skill. The First Steps indicators act as sign posts on this path. They mark out where the child is and so what the child has achieved (and has yet to achieve). The first aim of the analysis is to identify where these sign posts are along the path and, in so doing, to estimate the difficulty of each of the indicators.

It should be noted that this approach assumes that there is one underlying continuum that goes to make up the process of learning to spell. Some theorists would argue that learning to spell is a multi dimensional process which cannot, therefore, be captured using a single continuum. The judgement made here is that it can be captured on a single continuum. This judgement is based upon the view that it is reasonable to claim that some children spell better than others. In such a claim there is an implicit assumption that there is only one organising dimension being tapped so the use of a continuum is appropriate.

b. An ideal model for the distribution of indicators within phases along a developmental Continuum.

Having estimated the difficulty of the Spelling Developmental Continuum indicators - the first aim of the data analysis - the next aim is to establish how well the observations that teachers make about the development of literacy match the developmental Continuum proposed by First Steps. This task is referred to as the empirical testing of the validity of the Continuum.

The empirical testing of the validity of the Spelling Developmental Continuum involves comparing the order of the indicators proposed by First Steps with the order produced by the analysis of the data supplied by teachers. This comparison, however, is constrained by the fact that the indicators are ordered in First Steps by allocating them to phases. Indicators within a phase are not ordered.[3] Consequently, if a comparison between the ordering of the indicators derived from the teachers' data and

[3]Some indicators are classified as more important (the 'Key' indicators) but they are not ordered in terms of the sequence of development within the phase.

a First Steps Continuum is to be made, then the indicators must be treated by grouping them into phases. This raises a question: If the indicators are to be ordered within phases how should the phases group the indicators along a scale of difficulty?

To answer this question a model is proposed showing the ideal relationship between groups of indicators within phases, when those phases are ordered to reflect sequential development. Such an ideal model will not be found in reality because of small differences in the way in which, at least some, students learn to spell, variation in the teachers' perceptions of students' competencies and because of errors made by teachers in their judgements. Some teachers may also use teaching strategies which direct children's development away from normal patterns of development. Nevertheless, such a model provides a standard against which to assess how well the First Steps Spelling Developmental Continuum approaches the ideal.

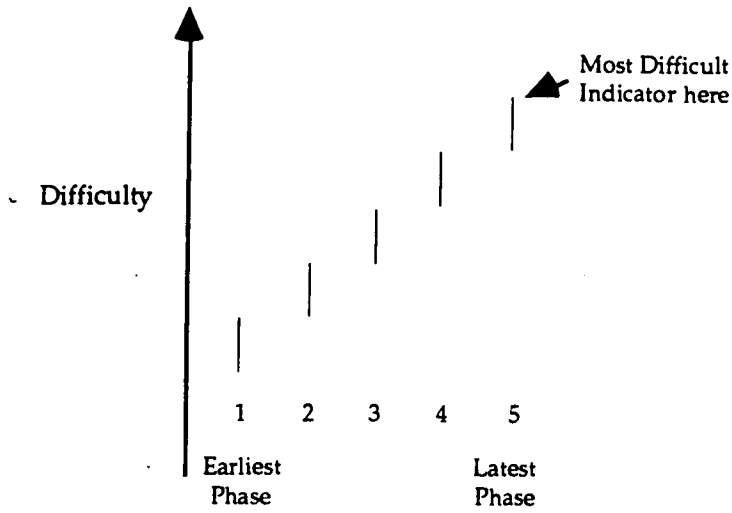
The model proposes, first, that the phase depicting the earliest stages of development should have all of its indicators situated towards the bottom or less difficult end of the scale. Conversely, the phase depicting the most advanced stages of development should have all its indicators situated towards the top or most difficult end of the scale. Other phases should fall between these extremes in the appropriate order. Secondly, each group of indicators within a phase should occupy proportionally the same distance along the scale of difficulty as each of the other groups of indicators. Thus, for example, if there are five phases, each phase should range over 20% of the scale. Thirdly, each group of indicators should occupy a unique location on the scale. The location of the phases should not overlap along the difficulty scale. Exhibit 6 shows the proposed ideal distribution of indicators by phase.

The short vertical lines in Exhibit 6 represent the spread of difficulty of the indicators within each phase. The most difficult indicator is situated at the top of the range of indicators in Phase 5. This is marked on the exhibit. Exhibit 6 shows that the spread of estimated difficulty for the indicators within each phase is about the same. There is no overlap between the phases nor is there a gap between them.

The rationale for the characteristics of the ideal model is now given.

Early phases should contain indicators low on the difficulty scale, intermediate phases should contain indicators of intermediate difficulty and later phases should contain indicators of highest difficulty. If the phases are not organised in this way, then they are not depicting the sequence of development that children go through. The reason for having the phases is to depict this sequence of development.

Exhibit 6: An ideal model showing the distribution of indicators of a developmental continuum when ordered by phases.



There should be a spread of difficulty estimates within a phase because development is seen as occurring along a Continuum and not in stages. If development occurred in stages it would be expected that each indicator within a phase would have the same estimated difficulty. However, the spread of indicators within a phase should not be too wide because this will lead to poor discrimination when plotting the development of children. There is little point in allocating a child to a stage if that stage, for example, covers a significant span of their school years. Reasonably fine levels of discrimination are required if development is to be charted and the indicators within a phase are to operate as something more than a checklist of skills. This can be achieved by having the phases ordered along the difficulty scale such that each occupies the same proportion of the total spread of the scale. It should be noted, however, that while 'equal spread' might be thought of as an ideal, it is not necessary to the successful construction and use of a Continuum.

The spread of the estimates of difficulty within one phase should not overlap with the spread in any other phase because this can lead to difficulty in establishing the level of development of the child. For example, take the extreme case where the spread of estimated difficulty of indicators within two phases entirely overlaps the other on the difficulty scale. When this occurs, allocating a child to one of those phases does not assist in locating that child along the developmental Continuum. This suggests that the more overlap there is between phases, the more ambiguity there will be about the location of the child on the Continuum.

Ideally, gaps between the spread of estimates of difficulty within one phase and an adjoining phase should not occur. A gap means that if the child is at a location in their development along the Continuum where this gap occurs, then their level of development may be under-estimated by a teacher using such a Continuum. However, as a gap does not lead to a confusion about the sequence of development of the child along a Continuum, it is less of a problem than having large overlaps between the phases.

If the ideal model is regarded as a valid depiction of how the indicators within phases ought to be ordered along the difficulty scale, then two of the main research questions can be interpreted in terms of this model. The first question - Are the indicators within a phase at about the same level? - requires that the spread along the difficulty scale of the indicators within any one phase is approximately similar to the spread of any other phase. The second question - Do the phases reflect a sequence which implies increasing difficulty? - requires that there is minimum overlap and no gaps between each phase. The significance of any overlap or gap which may be found will be assessed using the ideal model as a criterion.

This method of contrasting the observed with an ideal model can also be used to examine the location of the difficulty estimates of the key indicators within phases. This will permit some judgements to be made about their appropriateness as key indicators. For example, a key indicator which is very easy, compared with the other indicators within a phase may need to be reviewed. The question about their 'keyedness' is, however, largely dealt with using another approach.

In summary then, the validation of the Spelling Developmental Continuum will involve using the observations made by teachers about the students' competencies on indicators to estimate indicator difficulties. These observations can then be compared with the ideal model depicted in Exhibit 6. How well the teachers' observations match the model will shape the conclusions drawn about the validity of the Spelling Developmental Continuum.

c. Validation of the Spelling Developmental Continuum

The validation begins by displaying the indicators of the Spelling Developmental Continuum along the difficulty scale in the most detailed way. As the argument about the validity of the Continuum unfolds these data are displayed with less and less detail. It was decided to begin with the most detailed display because only this display allows individual indicators to be identified. Once the reader is familiar with this display they can refer to it if particular indicators in other displays need to be identified.

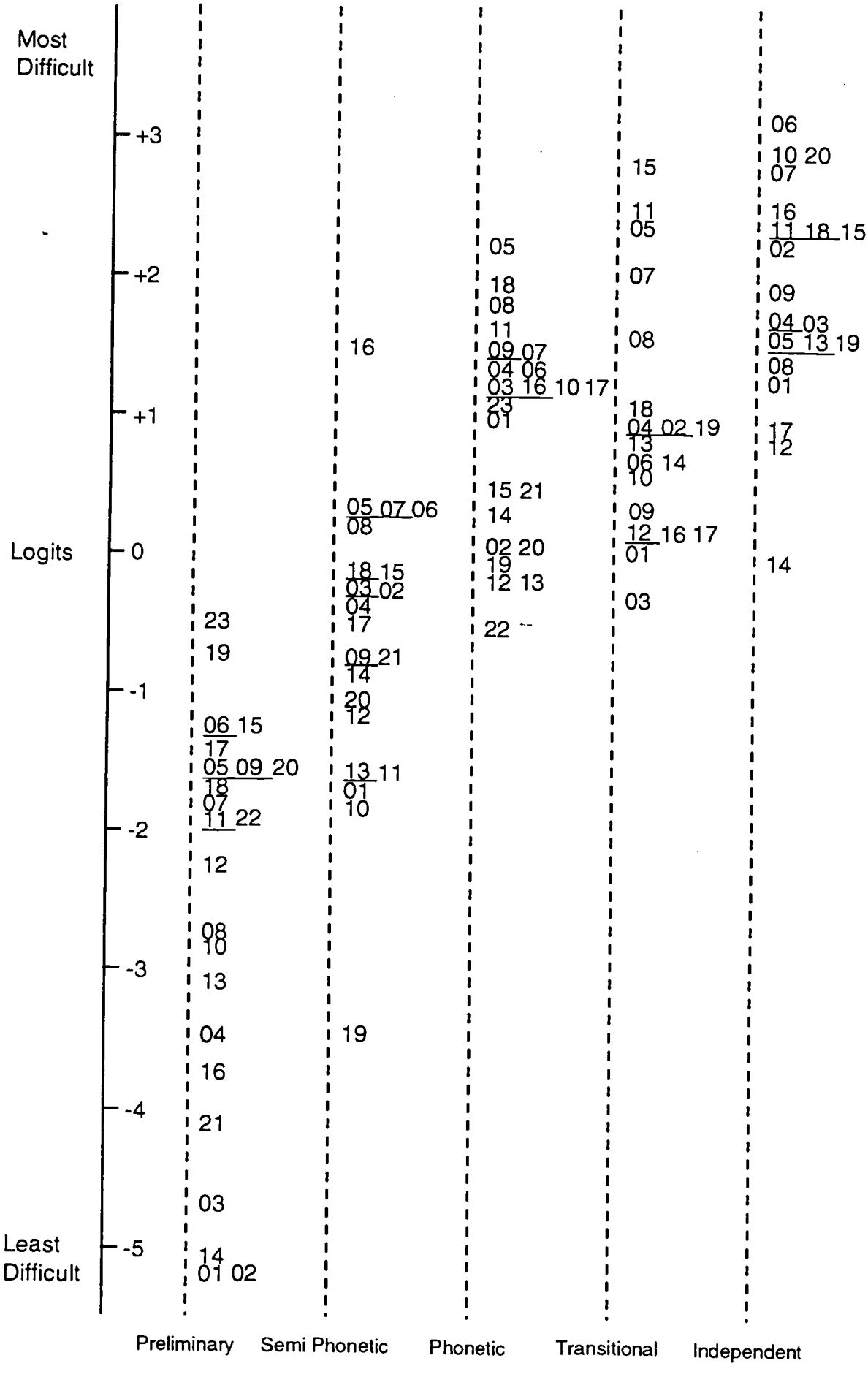
Exhibit 7 shows the distribution of the 106 indicators in the First Steps Spelling Developmental Continuum along a scale of difficulty. The indicators are grouped into the five phases of this continuum.

In Exhibit 7 the indicators are represented by a code number. The code numbers were used to make the graphical display readable. Refer to Appendix A which lists these code numbers and their associated indicators to retrieve the text of the indicators. The code numbers are the last two digits used in the code numbers in Appendix A. To look up a particular indicator the phase in which it is located will need to be known before consulting Appendix A. In Exhibit 7 the key indicators are marked in bold.

Exhibit 7 is useful for identifying individual indicators or for locating a known indicator. For example, it is clear from Exhibit 7 that indicator 19 in the Semi Phonetic Phase requires further investigation as it seems to describe a behaviour that is considerably less difficult than those behaviours described by the other indicators in this phase. By referring to Appendix A this indicator can be identified. It is code number 1219. It reads; 'The child talks about what has been drawn, written.'

While a detailed examination of 'outliers' can be useful for modifying the Continuum, the present concern is with the general patterns in the data. To do this, less detailed displays (similar to Exhibit 6 which shows a graphical depiction of the ideal model) are required.

Exhibit 7: Estimated difficulty of First Steps indicators from the Spelling Developmental Continuum within phases of development.



For code numbers see Appendix A.

Exhibit 8[4] shows the data as dots An examination of this dot plot shows that generally, each successive developmental phase groups indicators into bands along the difficulty scale at locations which reflect increasing difficulty. There is, however, some levelling out of the slope with the Phonetic and Transitional Phases. With this exception noted, it can be seen that, in general, the phases of the Spelling Developmental Continuum group the indicators in an order similar to that of the ideal model.

Exhibit 8: Difficulty estimates of indicators within phases of the First Steps Spelling Developmental Continuum

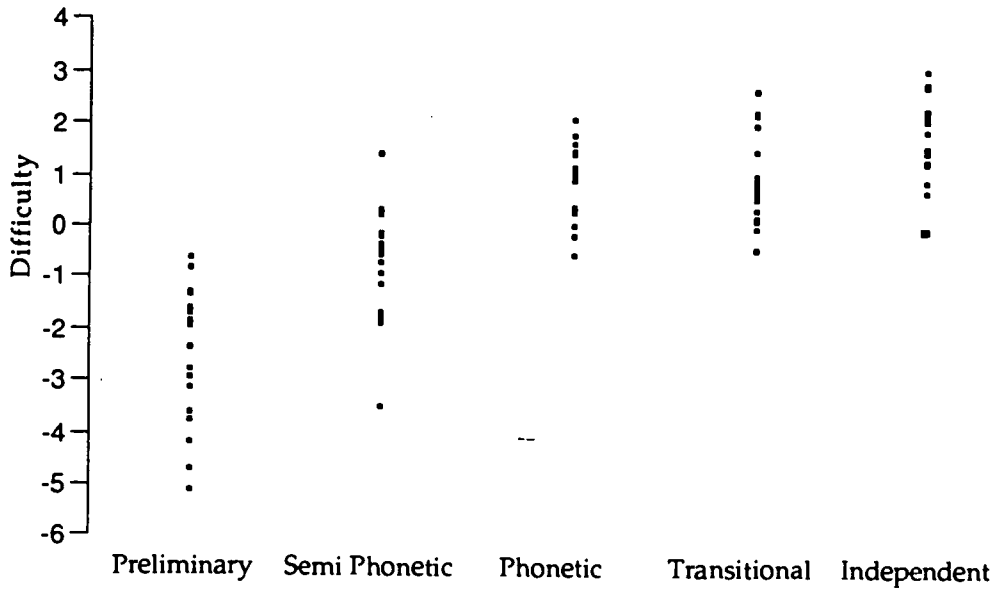


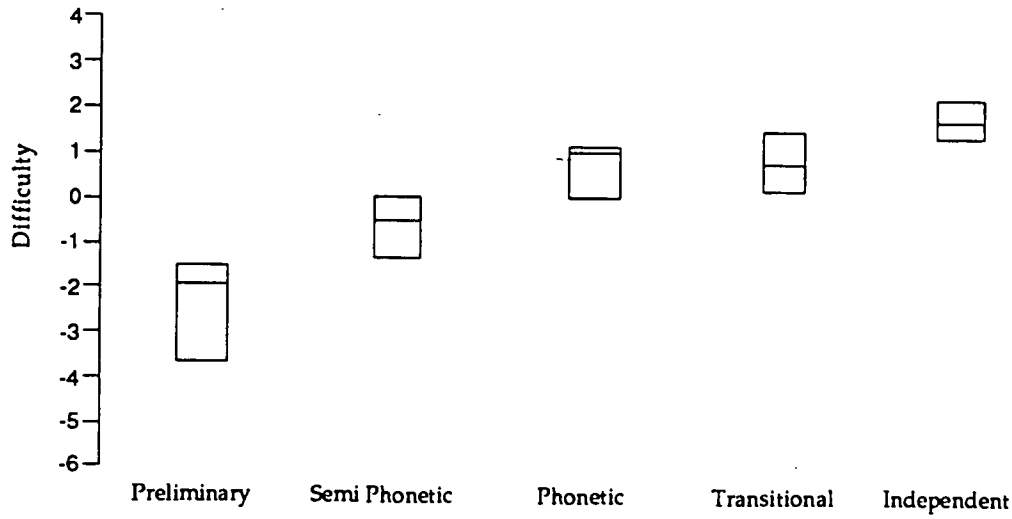
Exhibit 12 is, however, unsuitable for making judgements about the spreads and so about the overlap of the phases. It is unsuitable for two reasons. First, some dots represent more than one indicator (those with the same estimated difficulty) and so not all data are visually represented here. Secondly, a visual examination of a dot plot such as Exhibit 8 can only judge the range of the estimates. The range, however, is not the best measure of spread. It is susceptible to the effect of outliers - points which assume an unexpectedly extreme value when compared with the other values in the group of which they are part. There is some evidence in Exhibit 8 that some indicators are 'outliers'. For example, there are two indicators with relatively high estimates of difficulty in the Preliminary Phase, and others either too high or too low in each of the other phases. There are other, better measures of the spread than the range.

To complement Exhibit 8 then, another display summarising the data in a systematic way, which also reduces the effect of outlying estimates of difficulty, is required. This is done in Exhibit 9.

[4]The difficulty scale on this and all related plots is measured in logits. A logit is the odds of an outcome transformed to a logarithm with the base *e*.

Exhibit 9 shows the data using the median to represent the measure of central tendency and the interquartile range (the central 50% of the data around the median) to represent the spread. These measures are resistant to the effect of outliers. The data in Exhibit 9 are displayed using a type of box plot. The lower boundary of the box identifies the value above which 75% of the estimates fall and the upper boundary of the box identifies the boundary below which 75% of the estimates fall. Thus, 50% of the estimates are located between the top and the bottom of the box. The horizontal line inside the box marks the location of the median. In some boxes the median is not located centrally. In these cases the data are concentrated on the side of the box which is closer to the median. The width of a box is a function of the number of indicators in the phase. The more indicators there are in a phase, the wider is the box.

Exhibit 9: Box plots of difficulty estimates of indicators within phases of the First Steps Spelling Developmental Continuum



An examination of the location of the medians in Exhibit 9 for each phase confirms the pattern previously observed in the dot plots. Except for the Transitional Phase, the median for each phase is located successively higher on the difficulty scale.

The boxes in Exhibit 9 are approximately the same length, although the Preliminary Phase is rather longer than the others and the Independent Phase somewhat shorter. Most phases thus have an appropriate width to their spread of estimates. The observed data, in this regard, come close to matching the ideal model.

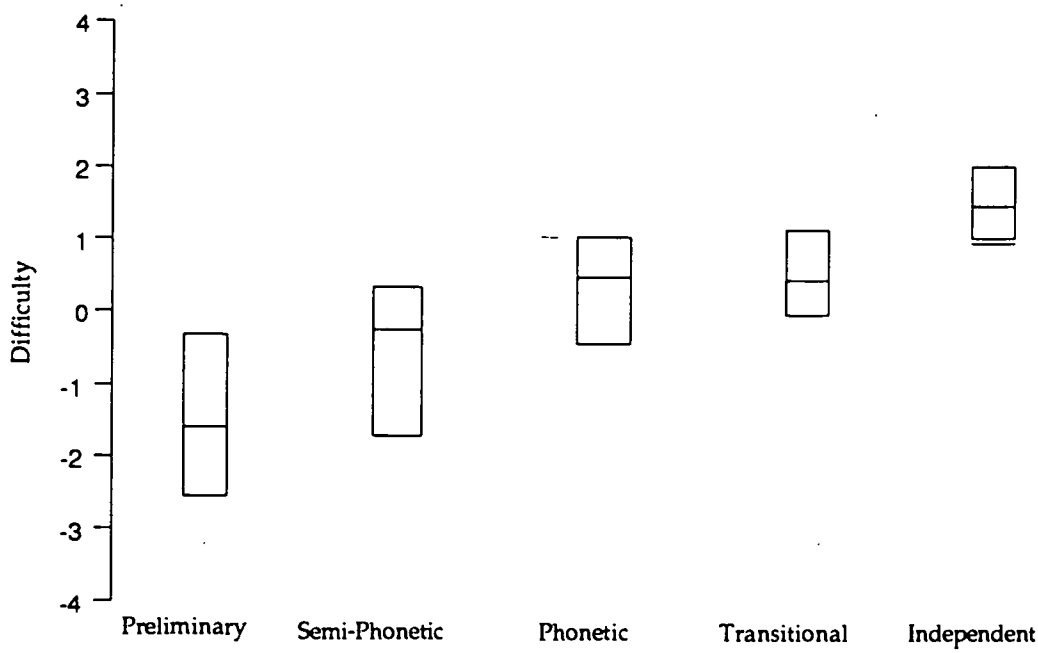
The final element to be examined in the validation of the Spelling Developmental Continuum is the extent to which the phases within the Continuum overlap along the difficulty scale. An overlap between phases is a problem because if it occurs to any

great extent, the phases will not depict development. Its practical effect is to jeopardise the ability of a teacher to use the phases to locate a child on Continuum.

An examination of Exhibit 9 shows that there is very little overlap between any of the phases except for the Transitional Phase which considerably overlaps with the Phonetic Phase. This is a concern.

It should be noted, however, that overlaps shown in Exhibit 9 represent an improvement over the earlier version of the Spelling Continuum. Exhibit 10 shows the pattern observed for the earlier version of the Spelling Continuum.

Exhibit 10: Box Plots of difficulty estimates of indicators within phases of the earlier version of the First Steps Spelling Developmental Continuum



The earlier version of the Spelling Continuum had a serious overlap between the Preliminary and Semi Phonetic Phases, a less serious but noticeable overlap between the Semi Phonetic and Phonetic Phases as well as a significant overlap between the Phonetic and Transitional Phases. In the revised version the overlap between the Phonetic and Transitional Phases is all that remains. In this respect, then, the modifications made to the Spelling Continuum seem to have led to a clearer definition of the way in which children develop their spelling skills.

In First Steps, the location of a child within a phase is not established by the use of all indicators. There are certain indicators which have been defined as 'key' and it is these 'key' indicators which are used to allocate a child to a phase of development.

Accordingly, it is how these key indicators are spread within phases and how much overlap there is between phases for these key indicators which is critical for establishing how reliably children will be placed into a phase. Exhibit 11 was prepared using the estimates of difficulty for the key indicators only.

Exhibit 11: Box plots with data points overlaid of the difficulty estimates of key indicators within phases of the Spelling Developmental Continuum.

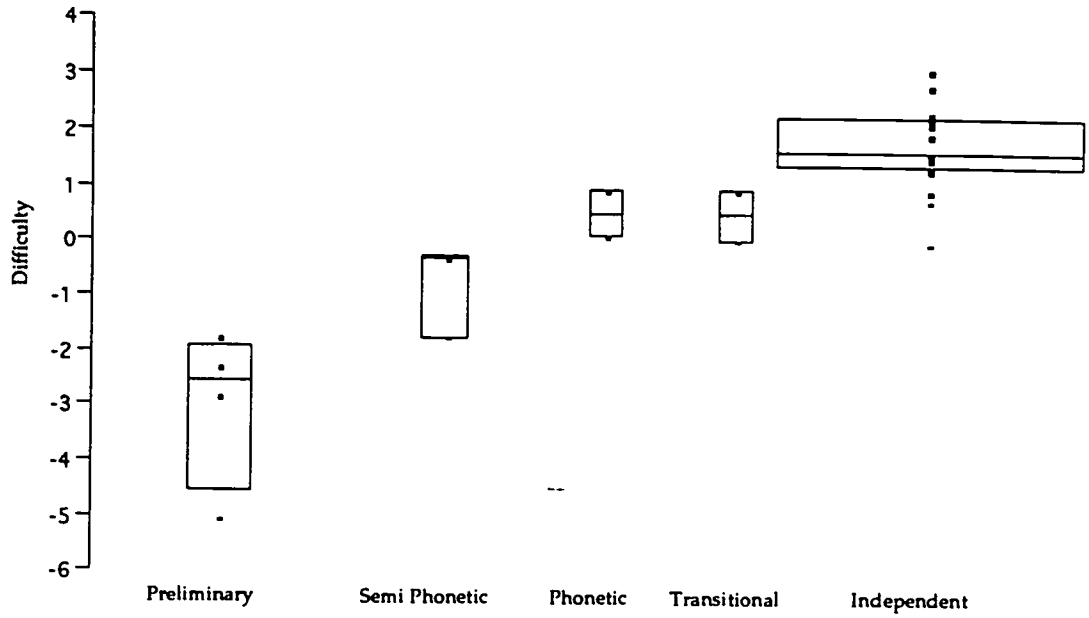
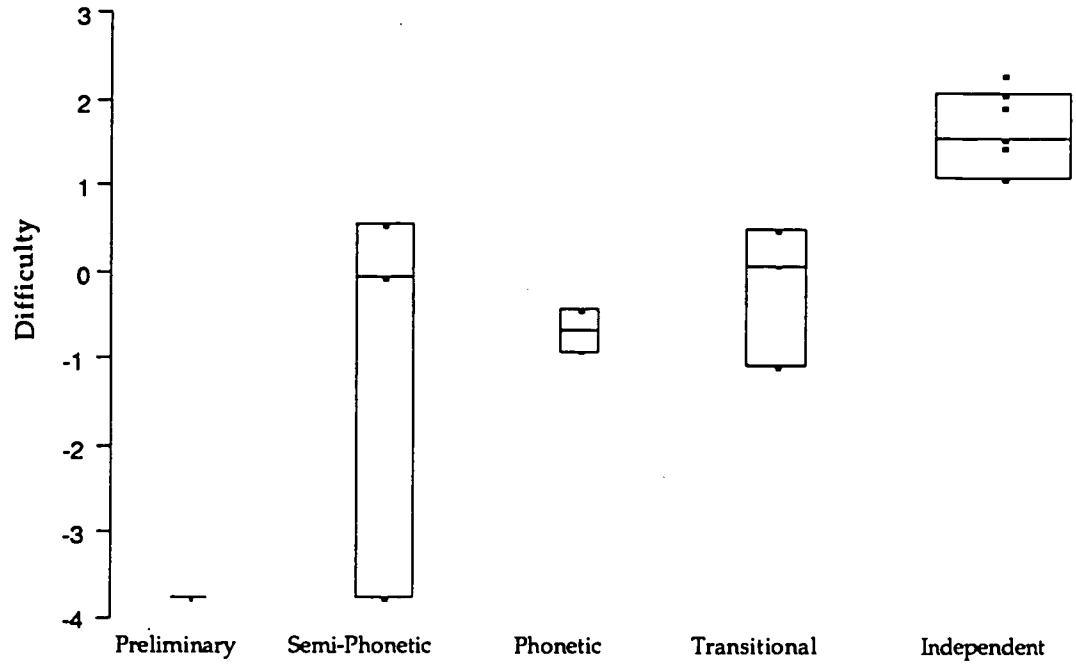


Exhibit 11 shows that there are no gaps between any of the phases. Indeed, there is a near perfect match between the bottom and top of most of the adjacent boxes. There is, however, a total overlap between the key indicators of the Phonetic and the Transitional Phases. This is a serious concern. It means that the key indicators from these two phases cannot discriminate between children's level of development.

There seem to be a number of key indicators in the Independent Phase which are relatively easy. Given the large number of key indicators in this phase (19 in total), the small amount of overlap caused by these few low difficulty indicators should probably not be treated as a problem.

Once again, it is clear that the changes made to the Spelling Developmental Continuum have markedly improved it. Exhibit 12 shows the pattern observed for the key indicators from the earlier version of the Spelling Continuum.

Exhibit 12: Box plots of the difficulty estimates of key indicators within phases of the 1992 version of the First Steps Spelling Developmental Continuum.



Note that there is now considerably more key indicators in the Independent Phase than there was in the previous version of the Spelling Development Continuum. This has not led to a change in the relationship between this and the Transitional Phase.

There is, now, for the key indicators of the modified version of the Spelling Continuum, far less overlap between phases. For example, contrast the overlap between the Semi Phonetic phase in Exhibit 12 with the near perfect fit in the later modified version (Exhibit 11). There is also a more even spread of difficulty along the difficulty scale, For example, compare the height of the box of the Semi Phonetic Phase with the Semi Phonetic phase in the earlier version. There are no equivalent discrepancies in the later version of the Spelling Continuum.

Despite these improvements, there are difficulties with the new version. Some have already been noted. Additionally, it will be noticed that both the graph depicting the difficulty estimates of all the indicators from the Spelling Developmental Continuum and the graph depicting the difficulty estimates of the key indicators have a similar shape. There is a steep rise in the estimates of difficulty across the first three phases, and a levelling off across the Transitional Phase and a slight increase with the Independent Phase. It would be preferable if there was a consistent and rising slope across the phases. One explanation for the observed patterns might be that teachers are assessing children as competent with respect to the children's peers, and not with respect to a standard measured against a literate adult. Teachers may therefore be

perceiving some behaviours described by indicators as easier than was intended by First Steps.

In summary then, the evidence collected from the teachers about the competency of their students on the revised First Steps Spelling Developmental Continuum indicators suggests that the indicators are, with the probable exception of the Transitional Phase, grouped into the appropriate phases of the Continuum and to this extent, validly depict the development of children. Similarly, with the exception again of the Transitional Phase, the key indicators are, generally, correctly located within these phases and consequently are reliable guides for placing children into developmental phases. This represents a marked improvement in the revised Spelling Developmental Continuum compared with the earlier version.

Finally, it should be noted that where there are large overlaps between phases there are a number of possible reasons for this occurring. One has just been discussed. Some other reasons include:

Some indicators have been placed in the wrong phase by First Steps. By moving the incorrectly located indicators into the correct phase the problems of overlap and of incorrect sequencing of the phases will be remedied.

Some indicators are imprecisely worded leading teachers to have differing interpretations of them. If the wording of these indicators is changed to clarify their meaning then the indicators may be more precisely located.

Some examples, which form part of the wording of an indicator may be misleading. Consider the indicator from the Semi Phonetic Phase of the earlier version of the Spelling Continuum, 'The child writes one or two letters for sounds then adds random letters to complete the word eg crecuea (creature).' (208 in the old version.) The wording 'The child writes one or two letters for sounds then adds random letters to complete the word' may be perfectly clear but the example(s) following may be inconsistent with this meaning. In fact, the earlier validation showed that there were problems with this indicator. In the light of this, it was decided that the spelling of 'creature' as 'crecuea' ought properly to be regarded as the product of a child, not in the Semi Phonetic Phase, but as the product of a child in the later Phonetic Phase. (The changed version is seen at 1207 in Appendix A where no reference is made to 'crecuea'. A review of the

effect of the examples, such as was done with this indicator, could lead to a more precise interpretation of the indicator by teachers.

Some phases are intrinsically difficult to discriminate between. It may be the case that the differences between two phases are both real and consequential but also subtle and difficult to detect. In this case, teachers' interpretations will be inconsistent when attempting to distinguish between phases.

Pedagogical practices discourage children from following the development depicted in the Continuum.

Some indicators may never be exhibited by many children. First Steps personnel have argued that some indicators may only ever be displayed by a small number of children. If this is so, then under the Rasch model, these indicators will be estimated to be more difficult than they actually are. This argument cannot, however, apply to key indicators as all children must display them in order to be placed on a continuum.

Each of these factors may alone or in conjunction affect the estimated difficulty of the indicators.

d. How 'key' are the key indicators?

Every phase of a First Steps Continuum has some indicators defined as 'key'. These indicators are used to allocate children to a phase of development. They were defined as 'key' by First Steps using in-house research done by First Steps personnel and advice taken from the users of First Steps.

The aim of this section is to examine how 'key' these 'key indicators' are. First, however, an introduction is given to the method by which the 'keyedness' of the key indicators is estimated.

Earlier, a First Steps Continuum was likened to a path along which indicators are placed to act like milestones or sign posts. These milestones tell the teacher where the child is in his or her development. So far, the analysis has been concerned with locating where these milestones are along the length of the path. The next task might be likened to establishing how close these milestones are placed to this path. If the milestones are close to the path then their message is clear and unambiguous about a

child's location on the path. Such indicators would be good candidates for being defined as key indicators. The further from the path the milestones lie, the more indistinct and ambiguous becomes their message. If they lay a long way from the path it may not be clear that they refer to this path at all but to another.

This analogy, using milestones and paths needs to be treated cautiously for, like all analogies, it is limited. A more precise description of the approach used is also needed. A First Steps Continuum can be treated as a variable. This variable, when measured can be construed as tapping an underlying 'trait' named, say, 'Spelling ability' (in the case of the Spelling Developmental Continuum). Once conceived this way, the Rasch modelling technique can be used to provide an estimate of the extent to which any one indicator is consistent with this underlying variable. If a 'key indicator' is defined as an indicator which is strongly consistent with the underlying variable, then Rasch modelling can be used to estimate how 'key' the key indicators of a First Steps Continuum are. It can also show which indicators might be good candidates for becoming key indicators.

The measure used to estimate the consistency of an indicator with the underlying variable is called the 'Infit Mean Square'. Exhibit 13 shows values of the Infit Mean Square for each of the indicators from the Spelling Developmental Continuum. The scale has been divided into three zones. There is a left hand zone, a central zone which has a column of dots marking its boundaries and a right hand zone. Although the locations of these zones are somewhat arbitrary they are based upon practical experience with this technique.[5]

An indicator with a value falling inside the central zone is measuring the underlying variable to a satisfactory extent. In Exhibit 13 an example of one such indicator is the indicator coded with the number 1101.

An indicator with a value in the right hand zone (that is with an Infit Mean Square value of about 1.3 or more) has a less than ideal correlation with the other indicators developed for this Continuum. (See the indicator coded 1105 in Exhibit 13.)

Indicators with Infit Mean Square values in the left hand zone of Exhibit 13 are strongly correlated with the developmental dimension being defined by the full set of

[5]Given the use of the 'path' as an analogy for a First Steps continuum throughout this report it is probably important to note that the central column in Exhibit 13 ought *not* to be regarded as representing a path.

indicators. These indicators can be regarded as candidates for being defined as 'key indicators'. Indicator 1103 in Exhibit 13 is an example of one such indicator.

In Exhibit 13 the letter 'K' in the body of the table marks the location of the Infit Mean Square for each of the key indicators of the Spelling Developmental Continuum. The Infit Mean Square of the other indicators is marked using an aster '*'. The first column lists the code number of each of the indicators in the Spelling Developmental Continuum that were included in the analysis. Appendix A provides the link between these code numbers and the text of the indicators. It might be useful, however, to note here that the second digit of the code number identifies the phase of the indicator. Thus the digit '1' in this location means the first or the 'Preliminary Phase' and '2' means the 'Semi Phonetic Phase' and so on.

Exhibit 13: Item fit of First Steps Spelling Developmental Continuum indicators.

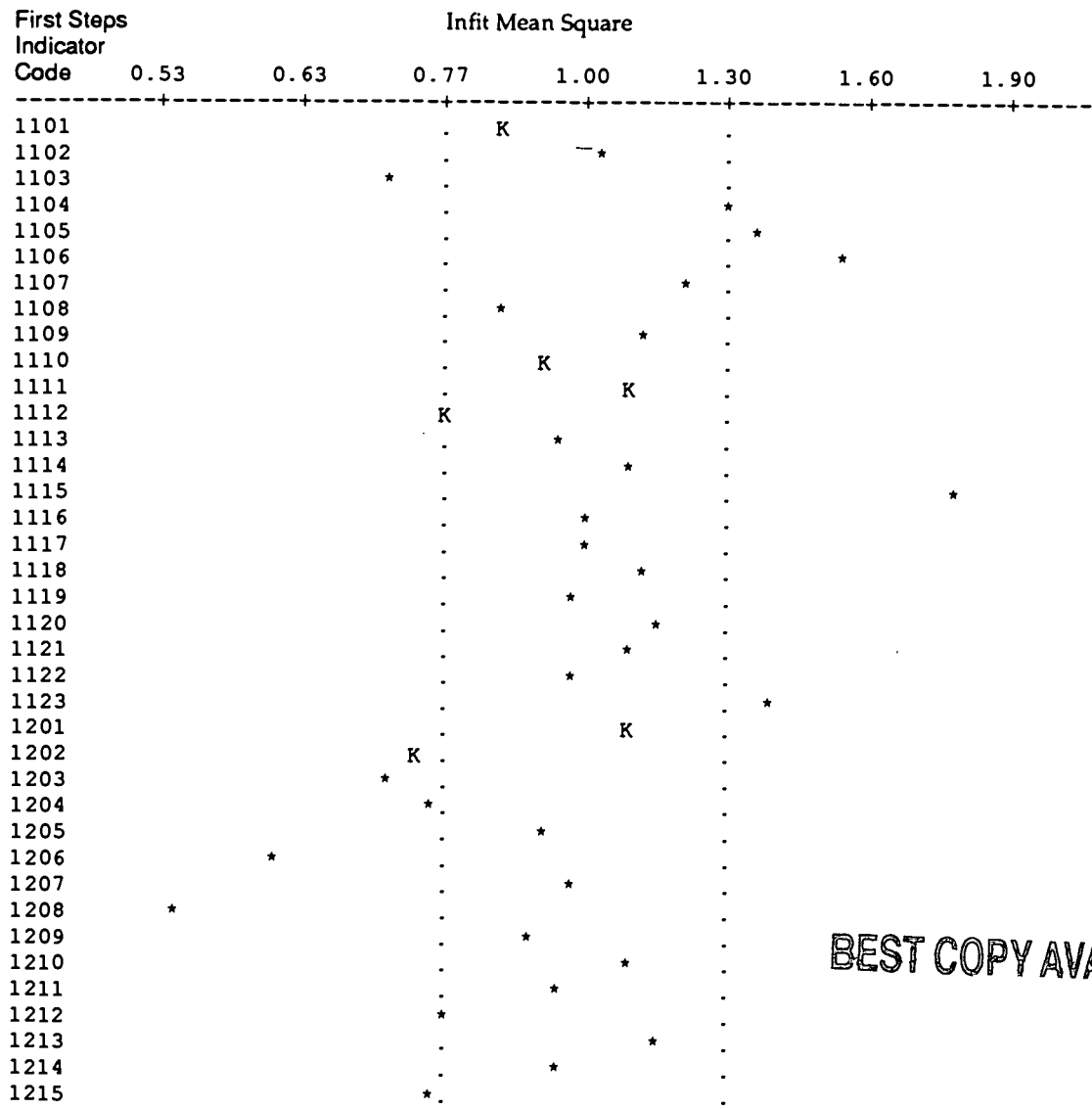


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Exhibit 20: Item fit of First Steps Spelling Developmental Continuum indicators *(Continued)*

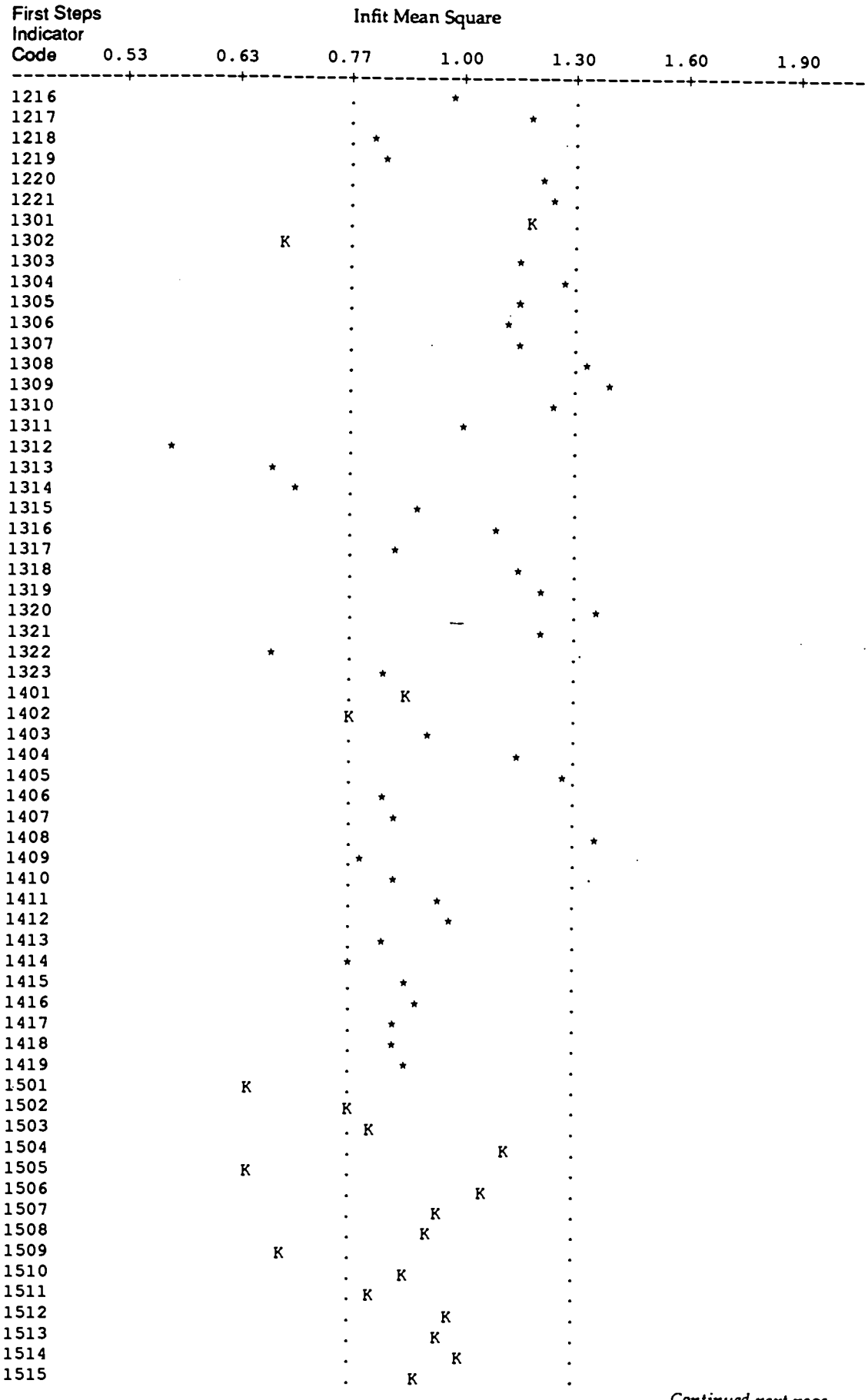

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Exhibit 20: Item fit of First Steps Spelling Developmental Continuum indicators *(Continued)*

First Steps Indicator Code	Infit Mean Square						
	0.53	0.63	0.77	1.00	1.30	1.60	1.90
1516			.K		.		
1517			K		.		
1518			K		.		
1519		K	.		.		
1520			.	*	.		

An examination of Exhibit 13 shows that all key indicators in the Spelling Developmental Continuum fall within the central zone or the left hand zone. All key indicators can thus be considered consistent with the concept that underlies or defines this Continuum, namely, 'Spelling ability'. In the vernacular - the key indicators all 'hang together well'.

Those indicators which are currently not defined as key but which might be considered as candidates for being defined as such, using these data, displayed in Exhibit 13 are as follows:

Phase	Indicator code
Preliminary	1103,
Semi-phonetic	1203, 1204, 1206, 1208, 1215
Phonetic	1312, 1313, 1314, 1322
Transitional	nil
Independent	nil

The indicators from the Spelling Continuum, identified as having a relatively low correlation with the majority of the indicators are:

Phase	Indicator code
Preliminary	1105, 1106, 1115, 1123
Semi-phonetic	nil
Phonetic	1308, 1309, 1320
Transitional	1408
Independent	nil

These indicators might be examined to make their interpretation by teachers more consistent. Alternatively, some might be considered for exclusion from the Continuum because, on these data, they are not contributing as well as might be hoped to the placement of children on to the Spelling Continuum.

In summary, all key indicators for the Spelling Developmental Continuum can properly be regarded as being consistent with the underlying variable of the Continuum. There are eight (or about 8%) indicators in the Spelling Continuum which might be reviewed. This represents a small, but important, improvement over the earlier version of the Spelling Continuum where 15 (about 15% of) indicators were identified as having a too high Infit Mean Square.

Over 90% of indicators in the revised version of the Spelling Continuum are consistent with the underlying variable. This is a very positive outcome.

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APPENDIX A:

Code numbers for the First Steps Spelling Developmental Continua indicators

For ease of use and to avoid cluttered graphical displays, indicators were allocated codes. The codes and the indicators are listed below.

The first digit identifies the Continuum from which the indicator comes. (The use of this digit means that it is easier not to confuse code numbers from this validation with the three digit codes used for the indicators in the earlier validation of the Spelling Development Continuum.) The second digit identifies the phase in which the indicator is located. The code 1 = the Preliminary Phase, 2 = the Semi Phonetic Phase, 3 = Phonetic Phase, 4 = Transitional Phase and 5 = Independent Phase. The third and fourth digits identify the indicators. The fifth character of the code indicates the response set available to teachers when they were entering the data. For those indicators with the code 'B' the teachers had the 'Yes' / 'No' / 'Beyond' response categories and for the code 'Y' they had the 'Yes' / 'No' response categories.

Indicator Codes

1. Preliminary Phase, Spelling Continuum

1101 Y
is aware that print carries a message

1102 Y
knows that writing and drawing are different

1103 Y
knows that a word can be written down

1104 B
draws symbols that resemble letters using straight, curved and intersecting lines

1105 B
uses a combination of pictorial and letter representations

1106 B
places letters randomly on a page

1107 B
mixes letters, numerals and invented letter shapes

1108 B
repeats some known alphabet symbols and often uses letters from own name

1109 B
writes random strings of letters

1110 B
uses writing-like symbols to represent written language

1111 B
uses known letters or approximations of letters to represent written language

1112 B
assigns a message to own symbols

1113 B
shows beginning awareness of directionality

1114 B
recognises own name or part of it, e.g. Stephen says "That's my name" looking at 'Stop'

1115 B
writes the first one or two letters of own name or word correctly and may finish with a random string of letters

1116 Y
writes own name correctly

1117 B
names or labels own 'writing' and pictures using a variety of symbols

1118 Y
reacts to environmental print

1119 Y
is willing to 'have a go' at representing speech in print form

1120 B
enjoys experimenting with writing-like forms

1121 Y
talks about what has been 'written' or drawn

1122 Y
asks questions about printed words, signs and messages

1123 Y
is keen to share written language discoveries with others

2. Semi - Phonetic Phase, Spelling Continuum

1201 Y
uses left to right and top to bottom orientation of print

1202 B
relies on the sounds which are most obvious to him or her. This may be the initial sound; initial and final sounds, or initial medial and final sounds, e.g. D (down),DN (down), DON (down),KT (kitten), (WT (went), BAB (baby), LRFT (elephant)

1203 B
represents a whole word with one, two or three letters. Uses mainly consonants, e.g. KGR (kangaroo), BT (bit)

1204 B
uses an initial letter to represent most words in a sentence,
e.g. s o i s g to c a s (Someone is going to climb a slide)

1205 B
uses letter names to represent sounds, syllables or words,
e.g. AT (eighty)

1206 B
uses a combination of consonants with a vowel related to a letter name,
e.g. GAM (game), MI (my)

1207 B
writes one or two letters for sounds, then adds random letters to complete the word, e.g. greim (grass), rdms (radio)

1208 B
begins to use some simple common letter patterns, e.g. th (the), bck (bike)

1209 B
uses a small bank of known sight words correctly

1210 B
recognises some sound-symbol relationships in context,
e.g. points to 'ship' and says "sh" or recognises first letter of name

1211 Y
knows the letters of the alphabet by name

1212 B
recognises some words in context, e.g. "That says 'dog'"

1213 Y
recognises rhyming words

1214 Y
recognises and copies words in the environment

1215 B
leaves spaces between word-like letter clusters,
e.g. I h bn sik (I have been sick)

1216 B
confuses words with objects they represent, e.g. "Train is a long word, 'cos trains are long. Butterfly is a little word...."

1217 Y
is willing to have a go at representing speech in print form

1218 Y
is confident to experiment with words

1219 Y
talks about what has been drawn, written

1220 Y
seeks response by questioning

1221 Y
is keen to share written language discoveries with others

3. Phonetic Phase, Spelling Continuum

1301 B
chooses letters on the basis of sound without regard for conventional spelling patterns, e. g. kaj (cage), tabl (table), birgla (burglar), vampia (vampire), pepl (people), sum (some), bak (back)

1302 B
sounds out and represents all substantial sounds in a word,
e.g. ktn (kitten), wacht (watched), anathe (another), aftrwoods (afterwards), siclon (cyclone) spidr (spider), isgrem (ice cream), necst (next), peepl (people)

1303 B
develops particular spellings for certain sounds often using self formulated rules, e.g. becoz (because)/woz (was), wher (were)/whas (was), dor (door)/ sor (saw)/mor (more), hape (happy)/fune (funny), poot (put)/wood (would)

1304 B
substitutes incorrect letters for those with similar pronunciation, e.g. oshan (ocean), nacher (nature), wold (world), heard (herd), disobays (disobeys), consert (concert), butiful (beautiful), tuched (touched), daw (door), tresher (treasure), thort (thought)

1305 B
adds an incorrect vowel after a correct vowel or consonant, e.g.
hait (hat), derum (drum), miu (my), fiene (fine), saeid (said),
beofore (before), seing (sing)

1306 B
represents past tense in different ways according to the sounds heard,
e.g. stopt (stopped), watcht (watched), livd (lived)

1307 B
uses the letter 'r' to represent a syllable, e.g. watr (water), mothr (mother)

1308 B
confuses short vowel sounds, e.g. pell (pill), yallow (yellow), u (a), pan (pen), lat (let), sow (saw)

1309 B
sometimes omits one letter of a two letter blend or digraph, e.g. fog (frog), mik (milk), leve (leave), plak (plank)

1310 B
still uses some letter name strategies e.g. awa (away), exellnt (excellent), mit (might), lrst (last), cav (cave)

1311 B
creates some words by combining known sight words and patterns
e.g. apreesheeight (appreciate), jenyouwine (genuine), MaThursday (Mother's Day)

1312 Y
usually spells commonly used sight words correctly,
e.g. in, has, his, he, my, the, here

1313 B
uses some known patterns in words, e.g....ing, th..., sh..., nght (night)

1314 B
is beginning to use syllabification for spelling longer words,
e.g. telefon (telephone), butufl (beautiful). Some syllables may be omitted.

1315 Y
identifies and uses knowledge of similar sounding words

1316 Y
experiments with spelling words in different ways

1317 Y
applies knowledge which has been gained from reading and words encountered in books, e.g. pirate, ship

1318 B
is beginning to use simple homonyms and homophones correctly, e.g. wind, read, park, their/there, one/won, for/four, too/to

1319 Y
is willing to 'have a go' at representing speech in print form

1320 Y
sees self positively as writer - speller

1321 Y
confidently makes decisions

1322 Y
is willing to spell on his/her own

1323 Y
uses word sources confidently

4. Transitional Phase, Spelling Continuum

1401 B
uses letters to represent all vowel and consonant sounds in a word; placing vowels in every syllable, e.g. holaday (holiday), gramous (grandma's), castel (castle), replyd (replied), gorrilas (gorillas), picture, dinosaur, spaghetti

1402 B
is beginning to use visual strategies, such as knowledge of common letter patterns and critical features of words, e.g. silent letters, double letters

1403 B
uses visual knowledge of common English letter sequences when attempting to spell unknown words e.g. thousend (thousand), cort (caught), doller (dollar)

1404 B
uses vowel digraphs liberally, but may be unsure of correct usage, e.g. plaiyed (played), kaingarows (kangaroos), ailyen (alien)

1405 B
may have over-generalised the use of silent 'e' as an alternative for spelling long vowel sounds e.g. mite (might), biye (buy), chare (chair), moste (most), rane (rain), growe (grow), ocaye (okay)

1406 Y
syllabifies and correctly inserts a vowel before the 'r' at the end of a word, e.g. 'brother' instead of 'brothr', 'water' instead of 'watr'

1407 Y
spells inflectional endings such as ...tion, ...ious, ...ight, ...ious conventionally

1408 B
includes all the correct letters but may sequence them incorrectly, e.g. yuo (you), shose (shoes), Micheal (Michael),thier (their), recieve (receive)

1409 B
is beginning to make spelling generalisations, e.g. uses some double letters correctly

1410 Y
is able to proof-read known bank of words

1411 B
is beginning to use knowledge of word meanings, e.g. sign/signature, medicine/medical, circle/circular

1412 B
usually represents all syllables when spelling a word, e.g. uncontrollablely (uncontrollably)

1413 Y
is extending bank of known words that are used in writing, including some subject specific words, e.g. February, Christmas, restaurant, diameter, conservation, scientific

1414 B
is beginning to use knowledge of word parts, e.g. prefixes, suffixes, compound words

1415 Y
uses more difficult homonyms and homophones correctly, e.g. sore/soar, pour/poor, board/bored

1416 Y
is willing to 'have a go' at spelling specialised words found in specific subject areas such as science and social studies, e.g. experament (experiment), abatories (abattoirs), lattitude (latitude), electrisity (electricity)

1417 Y
is aware of the importance of standard spelling for published work

1418 Y
is willing to use a range of resources

1419 Y
has an interest in words and enjoys using them

5. Independent Phase, Spelling Continuum

1501 Y
is aware of the many patterns and rules that are characteristic of the English spelling system, e.g. common English letter patterns, relationship between meaning and spelling

1502 Y
makes generalisations and is able to apply them to new situations, e.g. rules for adding suffixes, selection of appropriate letter patterns (-ion)

1503 Y
has mastered accurate spelling of prefixes, suffixes, contractions, compound words

1504 Y
uses context to distinguish homonyms and homophones

1505 Y
uses silent letters and double consonants correctly

1506 Y
continues to master words with uncommon spelling patterns and words with irregular spelling, e.g. aisle, quay, liaise

1507 Y
uses less common letter patterns correctly, e.g. weird, forfeit, cough, reign

1508 Y
uses a multi-strategy approach to spelling (visual patterns, sound patterns, meaning)

1509 Y
is able to recognise if a word doesn't look right and to think of alternative spellings

1510 Y
analyses and checks work, editing writing and correcting spelling

1511 Y
recognises word origins and uses this information to make meaningful associations between words

1512 Y
continues to experiment when writing new words

1513 Y
uses spelling references such as dictionaries, thesauruses and resource books appropriately

1514 Y
uses syllabification when spelling new words

1515 Y
has accumulated a large bank of known sight words and is using more sophisticated language

1516 Y
shows increased interest in the similarities, differences, relationships and origins of words

1517 Y
is willing to take risks and responsibilities and is aware of a writer's obligations to readers in the area of spelling

1518 Y
has a positive attitude towards self as a speller

1519 Y
has an interest in words and enjoys using them

1520 Y
is willing to use a range of resources and extend knowledge of words, including derivation, evolution and application

APPENDIX B:

Estimates of the difficulty of the indicators from the First Steps Spelling Developmental Continuum

The measure of difficulty of an indicator was estimated using Item Response Theory. The estimates of difficulty are presented, first, ordered by the indicator code number and then, secondly, ordered by the estimated difficulty of the indicator.

A note on the indicator codes:

The indicator codes have four digits. They are the same as those used in Appendix A. The response set codes 'B' and 'Y', used in Appendix A are not used here. Appendix A will need to be used to link the estimates shown in this Appendix back to the wording of the indicators.

The code numbers are ordered so that the first digit identifies the Spelling Developmental Continuum, the second digit identifies the phase and the third and fourth digits identify the indicator. The phase code numbers are in the order used by First Steps and so reflect the sequence that they have in the Continuum. So, for the Spelling Development Continuum, the second digit of the four digit code number means the following:

1 = Preliminary Phase
2 = Semi Phonetic Phase
3 = Phonetic Phase
4 = Transitional Phase
5 = Independent Phase

An example to help use the code numbers. The code number '1101' means 'the Spelling Development Continuum', 'Preliminary Phase', indicator '01', which is, 'The child is aware that print carries a message'.

Spelling Development Continuum Indicators

1. Indicators ordered by indicator code number.

Reading Indicator Code	Difficulty Estimate
Preliminary Phase	
1101	-5.06
1102	-5.06
1103	-4.62
1104	-3.53
1105	-1.52
1106	-1.22
1107	-1.78
1108	-2.73
1109	-1.53
1110	-2.86
1111	-1.81
1112	-2.32
1113	-3.09
1114	-5.05
1115	-1.24
1116	-3.68
1117	-1.27
1118	-1.65
1119	-0.75
1120	-1.55
1121	-4.11
1122	-1.92
1123	-0.54
Semi Phonetic Phase	
1201	-1.77
1202	-0.37
1203	-0.30

Semi Phonetic Phase Spelling Development Continuum Indicators (continued).

Reading Indicator Code	Difficulty Estimate
1204	-0.42
1205	0.35
1206	0.30
1207	0.34
1208	0.26
1209	-0.65
1210	-1.86
1211	-1.72
1212	-1.10
1213	-1.62
1214	-0.87
1215	-0.17
1216	1.45
1217	-0.51
1218	-0.12
1219	-3.47
1220	-1.06
1221	-0.85

Phonetic Phase

1301	0.92
1302	0.08
1303	1.11
1304	1.13
1305	2.10
1306	1.13
1307	1.21
1308	1.67
1309	1.44
1310	1.01
1311	1.52
1312	-0.15
1313	-0.15

Phonetic Phase Spelling Development Continuum Indicators (continued).

Reading Indicator Code	Difficulty Estimate
1314	0.34
1315	0.43
1316	1.10
1317	1.09
1318	1.81
1319	-0.13
1320	0.08
1321	0.42
1322	-0.51
1323	1.05

Transitional Phase

1401	0.02
1402	0.92
1403	-0.39
1404	0.94
1405	2.20
1406	0.67
1407	2.03
1408	1.50
1409	0.38
1410	0.58
1411	2.30
1412	0.22
1413	0.81
1414	0.80
1415	2.71
1416	0.17
1417	0.17
1418	1.02
1419	0.88

Independent Phase Spelling Development Continuum Indicators).

Reading Indicator Code	Difficulty Estimate
Independent Phase	
1501	1.29
1502	2.10
1503	1.58
1504	1.60
1505	1.55
1506	3.08
1507	2.77
1508	1.36
1509	1.90
1510	2.82
1511	2.21
1512	0.75
1513	1.54
1514	-0.04
1515	2.15
1516	2.32
1517	0.91
1518	2.20
1519	1.48
1520	2.82

2. Indicators ordered by estimated difficulty

Spelling Indicator Code	Difficulty Estimate
1101	-5.06
1102	-5.06
1114	-5.05
1103	-4.62
1121	-4.11
1116	-3.68

Spelling Indicator codes ordered by estimate of difficulty (continued).

Reading Indicator Code	Difficulty Estimate
11104	-3.53
219	-3.47
1113	-3.09
1110	-2.86
1108	-2.73
1112	-2.32
1122	-1.92
1210	-1.86
1111	-1.81
1107	-1.78
1201	-1.77
1211	-1.72
1118	-1.65
1213	-1.62
1120	-1.55
1109	-1.53
1105	-1.52
1117	-1.27
1115	-1.24
1106	-1.22
1212	-1.1
1220	-1.06
1214	-0.87
1221	-0.85
1119	-0.75
1209	-0.65
1123	-0.54
1217	-0.51
1322	-0.51
1204	-0.42
1403	-0.39
1202	-0.37
1203	-0.3

Spelling Indicator codes ordered by estimate of difficulty (continued).

Reading Indicator Code	Difficulty Estimate
1215	-0.17
1312	-0.15
1313	-0.15
1319	-0.13
1218	-0.12
1514	-0.04
1401	0.02
1302	0.08
1320	0.08
1416	0.17
1417	0.17
1412	0.22
1208	0.26
1206	0.3
1207	0.34
1314	0.34
1205	0.35
1409	0.38
1321	0.42
1315	0.43
1410	0.58
1406	0.67
1512	0.75
1414	0.8
1413	0.81
1419	0.88
1517	0.91
1301	0.92
1402	0.92
1404	0.94
1310	1.01
1418	1.02
1323	1.05
1317	1.09

Spelling Indicator codes ordered by estimate of difficulty (continued).

Reading Indicator Code	Difficulty Estimate
1316	1.1
1303	1.11
1304	1.13
1306	1.13
1307	1.21
1501	1.29
1508	1.36
1309	1.44
1216	1.45
1519	1.48
1408	1.5
1311	1.52
1513	1.54
1505	1.55
1503	1.58
1504	1.6
1308	1.67
1318	1.81
1509	1.9
1407	2.03
1305	2.1
1502	2.1
1515	2.15
1405	2.2
1518	2.2
1511	2.21
1411	2.3
1516	2.32
1415	2.71
1507	2.77
1510	2.82
1520	2.82
1506	3.08

APPENDIX C:

List of indicators form the Spelling Development Continuum not understood by some Kindergarten, Year, 1, 3, 5 or 7 classroom teachers.

This appendix lists the indicators which were not understood by one or more teachers. The indicators are identified by code numbers. See Appendix A to link the code numbers to the indicators.

Indicator Code	Number of Teachers not Understanding
1113	1
1115	1
1119	2
1208	1
1213	1
1217	1
1220	1
1307	2
1315	2
1317	2
1319	3
1320	1
1321	2
1322	3
1323	3
1404	2
1405	1
1407	1
1409	1
1413	1
1419	3

Appendix D.

Summary of the problem indicators from the first validation of the Spelling Development Continuum and the response of First Steps to these indicators.

This appendix lists the indicators which were identified as aberrant in the first validation of the Spelling Development Continuum. These indicators were aberrant because they were not understood by teachers, or because they did not tap the variable measuring spelling as well as other indicators or because they were considerably more or less difficult than the rest of the indicators within their Phase.

The indicators that were identified as a problem from the first evaluation of the Spelling Development Continuum are listed The changes made by First Steps personnel to these indicators are listed beside the problem indicators. Finally, a brief description of why the indicator was identified as a problem and why the First Steps personnel reacted the way they did is given.

The reference to the 'Infit Mean Square' as an explanation for why an indicator was defined as problematic refers to the failure of an indicator to tap spelling ability to a satisfactory extent when comapred with other indicators in the Continuum.

Original Wording	Changes recommended	Reason for Change/no change given by First Steps personnel.
The child uses a combination of pictorial and letter representations *(Preliminary phase)*	nil (1105) *This is the code number for the indicator. Consult Appendix A for the text to confirm the wording.*	Infit Mean Square No change. Attributable to error in data Will retain pending revalidation using pre-primary teachers
The child places letters randomly on a page *(Preliminary phase)*	nil (1106)	Infit Mean Square No change. Attributable to error in data Will retain pending revalidation using pre-primary teachers

Original Wording	Changes recommended	Reason for Change/no change
The child writes random strings of letters *(Preliminary phase)*	nil (1109)	Infit Mean Square No change. Attributable to error in data Will retain pending revalidation using pre-primary teachers
The child may read own writing differently at each reading *(Preliminary phase)*	Omitted from continuum.	Infit Mean Square This probably taps reading and writing rather than spelling ability
The child writes the first letter of name correctly and finishes the word with a random string of letters. *(Preliminary phase)*	New text: writes the first one or two letters of words correctly and may finish with a random string of letters. (1115)	Infit Mean Square Wording needs to be changed to clarify the meaning of the indicator.
The child names or labels own writing and pictures using a variety of symbols. *(Preliminary phase)*	nil (1117)	Infit Mean Square No change. Attributable to error in data
The child relies heavily on the most obvious sounds in a word, eg KT (kitten), WT (went), BE (baby) *(Semi-phonetic Phase)*	New text: relies on the sounds which are most obvious to him or her. This may be the initial sound, initial and final sounds or initial, medial and final sounds eg D (down), DN (down), DON (down) KT (kitten), WT (went), BAB (baby), LFT (elephant) (1202)	A key indicator which was too difficult for the phase. It was decided that the indicator was in the appropriate phase so needed to be reworded.
The child uses more letters for longer words *(Semi-phonetic Phase)*	omitted from the continuum.	Infit Mean Square Duplicates 221. *(This is the code number from the earler version of the Continuum)*

Original Wording	Changes recommended	Reason for Change/no change
The child writes one or two letters for sounds then adds random letters to complete the word eg crecuea (creature) *(Semi-phonetic Phase)*	writes one or two letters for sounds then adds random letters to complete the word eg greim (grass), rdms (radio). (1207)	An indicator which was too difficult for the phase. It was decided that the exemplar was distracting from the meaning of the indicator.
The child uses a small bank of known sight words correctly *(Semi-phonetic Phase)*	Nil (1209)	Infit Mean Square
The child confuses words with objects they represent, eg., 'Train is a long word because trains are long, caterpillar is a little word because ...' *(Semi-phonetic Phase)*	New text: confuses words with objects they represent, eg., 'Train is a long word because trains are long, butterfly is a little word because ...' (1216)	Infit Mean Square
The child develops particular spellings for certain sounds often using self-formulated rules, eg becoz (because), woz (was) *(Phonetic Phase)*	New text: develops particular spellings for certain sounds often using self-formulated rules, eg becoz (because), woz (was), hape (happy), fune (funny), sor (saw), dor (dor) (1303)	Infit Mean Square More examples needed to clarify the meaning of the indicator
The child substitutes incorrect letters for those with similar pronunciation, eg oshan (ocean), nacher (nature) *(Phonetic Phase)*	New text: substitutes incorrect letters for those with similar pronunciation, eg oshan (ocean), nacher (nature), wold (world), heard (herd), strech (stretch), insted (instead), disobays (disobeys), consert (concert), butiful (beautiful), tuched (touched), daw (door) (1304)	Infit Mean Square More examples needed to clarify the meaning of the indicator

Original Wording	Changes recommended	Reason for Change/no change
The child adds an incorrect vowel after a correct vowel or consonant, eg hait (hat), derum (drum), miu (my), fien (fine) *(Phonetic Phase)*	New text: adds an incorrect vowel after a correct vowel or consonant, eg hait (hat), derum (drum), miu (my), fien (fine), saeid (said), beofore (before), seing (sing) (1305)	Infit Mean Square Additional example to clarify meaning
The child confuses short vowel sounds, eg pell (pill) *(Phonetic Phase)*	New text: confuses short vowel sounds, eg pell (pill), yallow (yellow), u (a), pan (pen) (1308)	Infit Mean Square Additional example to clarify meaning
The child represents all the essential sounds of a word eg SPIDR (spider), KTN (kitten), (wacht (watched), anathe (another) *(Phonetic Phase)*	New text: sounds out and represents all substantial sounds in a word eg kitn (kitten), wacht (watched), anathe (another), afftrwoods (afterwards), siclon (cyclone) (1302)	A key indicator which was not difficult enough. It was decided that the exemplars were distracting and implied an easier task than was meant.
The child still uses some letter name strategies eg awa (away), exellnt (excellent) (Phonetic Phase)	New text: still uses some letter name strategies eg awa (away), exellnt (excellent), mit (might), lrst (last) (1310)	Infit Mean Square Additional example to clarify meaning
New Indicator for the Phonetic phase	New text: creates some words by combining known sight words and patterns eg apreesheeight (appreciate), jenyouwine (genuine), jimnasticks (gymnastics), Mathursday (Mothersday) (1311)	
The child uses common English letter sequences when attempting to spell unknown words eg thousend (thousand), cort (caught), doller (dollar) *(Transitional Phase)*	New text: uses visual knowledge of common English letter sequences when attempting to spell unknown words eg thousend (thousand), cort (caught), doller (dollar) (1403)	A key indicator which was too easy for the phase. It was decided to redefine this indicator as not a key indicator. It was also decided that it was in the appropriate phase but that it needed to be reworded so that it more clearly expressed the level of difficulty of the indicator.

Original Wording	Changes recommended	Reason for Change/no change
The child uses silent 'e' as an alternative for spelling long vowel sounds - may be overgeneralised, eg mite (might), biye (buy) *(Transitional Phase)*	Uses silent 'e' as an alternative for spelling long vowel sounds - may be overgeneralised, eg mite (might), biye (buy), chare (chair), moste (most), rane (rain), growe (grow), ocaye (okay). (1405)	Infit Mean Square Additional example to clarify meaning
The child correctly inserts a vowel before the 'r' at the end of a word, eg 'brother' instead of 'brothr' 'water' instead of 'watr'. *(Transitional Phase)*	syllabifies and correctly inserts a vowel before the 'r' at the end of a word, eg 'brother' instead of 'brothr' 'water' instead of 'watr'. (1406)	An indicator which was too easy for the phase. Reworded to communicate meaning more clearly
The child spells inflectional endings such as '-s', '-ing', '-est' conventionally (Transitional Phase)	New text: spells inflectional endings such as '-tion', '-ious, '-ough' conventionally (1407)	An indicator which was too easy for the phase. Reworded to communicate meaning more clearly
The child includes all the correct letters but may sequence them incorrectly: yuo (you), shose (shoes) *(Transitional Phase)*	New text: includes all the correct letters but may sequence them incorrectly: yuo (you), shose (shoes), Micheal (Michael), thier (their), recieve (receive). (1408)	Infit Mean Square Additional exemplars given.
The child uses letters to represent all vowel and consonant sounds in a word, placing vowels in every syllable, eg holaday (holiday), gramous (grandma's), honeted (hunted) *(Transitional Phase)*	uses letters to represent all vowel and consonant sounds in a word, placing vowels in every syllable, eg holaday (holiday), gramous (grandma's), castel (castle), replyd (replied), gorrilas (gorillas) (1401)	A key indicator which was not difficult enough. It was decided that this indicator belonged in this phase. Additional examples were given to clarify the meaning.
The child has a bank of known words that are used in writing *(Transitional Phase)*	New text: is extending bank of known words that are used in writing eg February, Christmas, restaurant, diameter, conservation (1413)	An indicator which was too easy for the phase. Reworded to communicate meaning more clearly

Original Wording	Changes recommended	Reason for Change/no change
The child Is willing to have a go at spelling difficult words eg abatories (abattoirs) *(Transitional Phase)*	is willing to 'have a go' at spelling specialised words found in specific subject areas such as science and social studies eg experament (experiment), abatories (abattoirs) (1416)	An indicator which was too easy for the phase.
The child is aware of social obligations as a speller *(Transitional Phase)*	is aware of the importance of standard spelling for published work. (1417)	Not understood by some teachers. Reworded to communicate meaning more clearly

First Steps personnel, in making or not making changes reported that they were constrained by:

- the need to keep the continuum reasonably stable for teachers to use
- the need to consider educationally important reasons eg some indicators were retained so that they functioned as reminders to teachers to keep an eye out for a behaviour.
- the need to keep the wording simple

Note that changes were not made to indicators which should be exhibited by pre-primary children pending validation with pre-primary teachers providing data.

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